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HALOGEN INCANDESCENT LAMP

The present invention relates to a halogen incandescent lamp suitable to be run on network voltage and comprising: a glass bulb having a high melting point and hermetically sealed by at least one pinch and defining the axis of the lamp; an inert gas fill and a halogen additive; a double-spiraled luminous body having two ends; a system of lead-in electric wires, which control a lead-in wire to the luminous body and which comprises lead-in wires connecting the ends of the luminous body to sealing sheets, which are inserted into the pinch or into the pinches, and which are incorporated into the pinch over a portion of their length.

Halogen incandescent lamps of this type are known from US 3,441,776. The lead-in wires comprise single spiral section in which the mandrels are fitted to provide stabilization. They are soldered together with molybdenum strips that are coated with a plate of molybdenum sealing foils.

This lamp has drawbacks which are due, among other things, to the high operating voltage (220V), which produces an electric arc between the two adjacent lead-in wires. The current conductors with their full mandrels may thus be heated in such

intensity that the pinch seal can no longer adequately evacuate the heat into the environment. In the final stage, this may cause the bulb to explode.

In order to solve the problem under consideration, German patent application No. 31 10 395 propose which was referred to a supplementary "thermosafety" in the region of the pinch of a halogen incandescent lamp having a pinch on one of two sides. What is involved is essentially a recess which is arranged in the region of the pinch and in which the inside current lead is guided over a portion of its length. Since the current lead is not incorporated into the glass, it is heated very quickly, and the lead-in wire melts rapidly and completely. However, this method is very costly because it is not possible to provide a pinch with a recess arranged therein, except in a very complicated manner. Moreover, this technique cannot be used for small lamps because the recess would occupy too much space. In order for lamps having a pinch on only one side, it is only possible for reasons of stability to provide only one of the two thermosafety lead-in wires so that the manufacturing process of the pinch remains very complicated.

It is the object of the present invention to further simplify the manufacturing method of a halogen incandescent lamp intended to operate on the network voltage and comprising a glass bulb having a high melting point and hermetically sealed by at least one pinch on one side and defines an axis of the lamp; it also comprises an inert gas fill and a halogen additive, a double spiral luminous element having two ends, a system of lead-in wires, which control an electric lead-in wire for the luminous elements, and which comprises lead-in wires which connect the ends of the luminous body to the sealing foils which are inserted into the pinch or pinches, and which are incorporated into the pinch seal over a portion of their length in order to ensure the safe operation of these lamps.

The problem is solved in that at least one of the lead-in wires is made of a single spiraling section in which a recess in the form of a sheath is formed and which does not comprise a mandrel; and the portion which is inserted into the pinched portion is free of quartz glass and forms a purge channel which ensures safety.

It is preferred if:

- The bulb is pinched on one side, with the luminous body being curved in the shape of a U or in the shape of a V, and the two lead-in wires or arranged approximately parallel in the form of single spiraled section and are incorporated by fusion into the pinch;

- The bulb is pinched on two sides, with the luminous body being arranged axially and a lead-in wire incorporated by fusion into a pinch in the form of a single spiraled section;

- The bulb is pinched on one side, with the luminous body being disposed axially and the lead-in wire, which leads to the input on the side of the pinch, being incorporated by fusion to the pinch in the form of a single spiraled section;

- The luminous body and the lead-in wires are made of a single metal wire;

- The first spiraled portion of the luminous body and the single spiraled section of the lead-in wires have the same inside pitch and diameter;

- The recess in the form of a sheath has a diameter ranging from 50 to 200 μm.;

- The ratio of the spiraled the lead-in wires to the diameter of the filament is less than 2.5;

- The single spiraled section is soldered directly to the sealing foil;

- The single spiraled section and the sealing foil are coated with a platinum paste in the soldering region.

The special value of the invention resides in the fact that safety can be obtained without any special additional measures. In choosing suitable dimensions for the single spiraled sections, the lead-in wire is in effect inserted into the pinched seal in such a way that at least its inside portion in the form of a sheath, and thus the region which is usually provided with a mandrel, remains hollow despite the pinching process. A recess, which is also arranged in the pinched region is superfluous as a result. Due to the shortness of the pinching process, the softened glass cannot penetrate into the single spiraled section, so that a recess in the form of a sheath remains. During the formation of an eclectic arc, the lead-in wire is heated until if is evaporated. What is essential is, primarily, that one lead-in wire, formed of a single spiral is evaporated more easily than a metal wire forming a mandrel were inserted into the single spiral, or if the lead-in wire were a solid metal wire. The evaporated material disengages from the recess at a very rapid rate. The electric arc is thus extinguished by itself. The pressure generated in this region of the pinch and the heat are nevertheless so small that an explosion of the envelope will not occur.

This type of safety action is more rapid and more secure than that of a large additional recess, because in the latter case, no significant suction of this type is generated (detachment of the recess material at a very high rate).

In order to obtain a maximum suction effect, the lead-in wire portion that is inserted into the pinch must be at least 3 mm long, while the portion penetrating the

inside of the bulb usually ranges from 1 to 4 mm in length. The diameter of the recess per se is preferably 50 to 250 μm.

One additional advantage among others is that the safety features that are usually integrated into the cap can be dispensed with.

The invention primarily relates to halogen incandescent lamps having a pinch on one side but also a pinch on both sides, and they are provided with glass bulbs of high melting point. For lamps having a pinch on one side, the luminous body may be curved in the shape of a U or in the shape of a V, with the lead-in wires in one embodiment being in the form of single spiral sections. In a second embodiment, one of the two lead-in wires may be a single spiraled section. Moreover, the invention may be employed for lamps having a pinch on only one side and an axial luminous body, which operates mostly on network voltages of approximately 110 V. It is simply advantageous, in this case, to connect the end of the adjacent luminous body of the pinch to sealing foil through the lead-in wire in the form of a single spiraled section. The other lead-in wire, which is guided in the form of a mounting wire to the distant end of the pinch, is not spiraled.

The invention also applies to lamps having a plurality of luminous bodies.

The expression "glass of high melting point" means that a quartz glass is preferred which has at least a 94% content by weight of SiO_2 (for example Vycor); but hard glass having a high boiling point is in principle also suitable.

The lamp according to the invention may be manufactured at a low cost, because only a few constitutive elements are required, and the manufacturing process is especially easily automated.

As a result, a halogen incandescent lamp is proposed which has a long service life (2000 hours) for general lighting purposes and is characterized by an increased safety factor.

The lamp in accordance with the invention may operate directly on the main voltage, i.e., approximately a range of 80 V to 250 V. Power typically ranges from 15 to 500 W. For general lighting, the embodiment of the lamp having a single side pinch may be surrounded by an exterior bulb. However, due to the small space it occupies, these lamp may also be used advantageously in reflectors (for example, parabolic lamps, cold reflector lamps) and they may be optionally provided with screw caps or pin caps.

The invention is elucidated greater detail below by means of a plurality of embodiment and in the drawings of which:

Figure 1 is a view of a first embodiment of a high voltage halogen incandescent lamp;

Figure 2 is a view of a second embodiment of a halogen incandescent lamp having an outside bulb.

Figure 1 illustrates a halogen incandescent lamp 1 employed for general lighting and a power of 75 W, which is suitable for being connected directly to a 220 V power source. It is provided with a cylindrical bulb 2 made of quartz glass and has an outside diameter of approximately 12.5 mm for an inside diameter of 10.5 mm (with a tolerance of 0.8 mm) and a total length of approximately 35 mm. One of the ends of the bulb 2 conforms to a cap 3 which is provided in the center with a tip 4. The other end of the bulb is closed by a pinch seal 5. The bulb which has a volume of 1.65 cm^3 is filled with a

mixture of inert gas comprising 80% Kr and 20% N_2, to which a halogen additive comprising 0.005% of $CRrC1F_2$ is added.

A luminous body 6 curved in the form of a U and double spiraled in a continuous manner extends over almost the entire inside length of the volume of the bulb, with the core 7 of the U, which extends transverse to the axis of the lamp, being arranged near the cap 3, while the two branches of the U forming the luminous spiraled sections 8 per se being approximately 15 mm long extending from the core 7 to the pinch seal and opening slightly toward the outside in the direction of the pinch seal 5. The luminous body 5 is supported by a support comprising a tungsten metal support wire 9 having a diameter of approximately 280 μm. The support is curved substantially in the plane through which the axis of the lamp passes and in such a way that between the two branches 10, 11, which contact the inside wall 12 of the lamp and are opposite one another and parallel to said axis, extends a transverse portion 13 which covers the inside diameter of the bulb. The first branch 10, which is significantly larger than the second branch 11 (approximately 21 mm in comparison to approximately 8 mm) extends almost over the entire inside length of the bulb and is inserted to a depth of approximately 0.8 mm into the pinch 5. Just below the cap 3, this rectangular branch 10 is bent in the transverse portion 13. Seen from the front, the transverse portion 13 is corrugated in such a way as to form three projections 14, 15 with two hollow grooves 16 between the same. The first and the third projection 14 are curved in the shape of a semi-circle, while the second projection forms a hook 15 at an acute angle, which grasps between said two grooves 16. The hook 5 [sic] is slightly offset parallel to the axis and relative to the plane of the support. The tip 17 of the hook terminates below the cap 3 of the bulb. The core 7 of

the luminous body is suspended at the hook 15 in such a way that the ends of the core 7 rest on the grooves 16, with the portion of the core being short-circuited in this manner by the hook 15. The transverse portion is axially symmetrical (in an elevated view), with the third hump 14 being transformed into the second branch 11. The free end 18 of the second branch is not trimmed.

The two luminous spiraled sections 8 are transformed at their ends into short spiraled sections 19, which are approximately 4 mm long and single spiraled to serve as lead-in wires for the current. The lead-in wires for the current 19 are incorporated by fusion into the pinch seal 5 over a length of 3 mm, and there they are soldered to the molybdenum sealing foils 20. In order to facilitate soldering, a region 22, approximately 2 x 2 mm in size of each foil is provided with a platinum paste. The lead-in wires 19 project from the pinch seal into the volume of the bulb simply from approximately 1 mm in such a way that the usual mandrels can be eliminated, except as for required for stabilization. At the outside end of the foils 20, mandrels 21 are soldered which project toward the outside beyond the end of the pinch seal 5.

The first spiral of the luminous body and the single spiraling of the lead-in wires for the current (filament diameter 36 μm) have an internal of 65 μm, which corresponds to a factor of the mandrel (ratio of the mandrel diameter to the wire diameter) of 1.81. The ratio of the pitch to the wire diameter is 1.66 for a pitch of 59. 6 μm.

The corresponding data for the second spiraling of the luminous body are:

Inside diameter 290 μm/factor of the mandrel 2.12; pitch 224 μm/ratio of the wire diameter 1.64.

In another embodiment of a 100 W/220 V lamp, the structure is practically analogous to the first embodiment, but only the luminous body, including the lead-in wires, have different dimensions. The diameter of the filament is 45 μm.

The data on the single spiraling of the lead-in wires and the first spiraling of the luminous body are:

Inside diameter 85.0 μm/mandrel factor 1.87; pitch 72.7 μm/ratio of the pitch to the diameter of the filament 1.60.

The data for the second spiraling of the luminous body are:

Inside diameter 370 μm/factor of the mandrel 2.11; pitch 245 μm/factor of pitch to the diameter of the filament 1.40.

The manufacturing process of the lamps has to overcome these two difficulties.

A critical moment is first the one involving the direct soldering of the single spiraled section to the foil. While a filament or spiraling with a mandrel is used a lead-in wire poses no problems, there exists the danger that during soldering of the fragile single spiraling, the spiraling is evaporated or at least damaged. Spot soldering with a weak current and weak pressure using N_2 scanning or active gas has proven to be especially advantageous. The soldering pressure must not exceed 100 N. Spiraling and a portion of the foil are advantageously coated with a platinum paste. The platinum paste must be deposited in such a fine layer that is merely moistens the foil.

During the pinching process, which is known per se, attention must be paid to accomplish the same is a very short time (usually from 0.1 to 0.2 second). The future pinch region must have a temperature of 1200 to 1300°C so that the softened quartz glass is till sufficiently viscous in order not to penetrate into the recess provided by the single

spiraling of the lead-in wires. For the same reason, the ratio of the pitch to the diameter of the filament and the single spiraling pitch of the lead-in wires must not be too great. Preferably, the ratio of the pitch to the diameter of the filament must be less than 2.5, and the inside diameter of the spiraling must range from 50 to 200 μm. Nor must the pressure of the pinch be too high. Pressures from 1 to 2 bar on the pinch jaws are typical.

In another embodiment (figure 2) the halogen incandescent lamp 1 described above, is mounted in an outside bulb 30. The contact pins 21 (optionally in two parts) are clamped into a bas in the form of a plate 28, which is incorporated by fusion into the collar 29 of the outside bulb 30 in a vacuum. The outside bulb 30 is provided with a screw cap 31.

The effectiveness of the measures according to the invention have been fully confirmed, notably by the fact that in the case of deliberately connecting a 110 V bulb to the 220 V network, the electric arc is safely extinguished and no explosion of the bulb will occur.

The invention is not limited to the illustrated examples. It is also suitable for halogen incandescent lamps which are intended to operate on a 110 V network. Moreover, the two spiraling sections may still be further subdivided. The shock resistance of the luminous body may still be improved by additional measures. The fill may comprise other constituents know per se; for example, CH_2Br_2 may be used as halogen additive. In place of a mount comprising a metal wire, it is also possible to employ tubular supports of quartz glass, which are made of the same material as the bulb, in order to attach the luminous body.

Owing to the invention, a halogen incandescent lamp can be made at an advantageous price, and consumes little power, i.e., up to 15 W, in order to connect directly to the network, and this is especially important for general lighting purposes.

Of course, the invention is conceived in a particularly advantageous manner for halogen incandescent lamps with a pinch on only one side and consume low power because, in this case, the effect of saving is obvious. But is can also be employed without any difficulty, for tubular halogen lamps and, especially for higher wattage. In tubular lamps spiraled filament supports may be used or tubular quartz glass supports may be used which are the same material of the bulb.

CLAIMS

1. Halogen incandescent lamp suitable for operating on network voltage and comprising:

- a glass bulb (2) having a high melting point and hermetically sealed by at least one pinch and defining the axis of the lamp;

- an inert gas fill and a halogen additive;

-a double-spiraled luminous body (6) having two ends;

- a system of lead-in electric wires, which control a lead-in wire to the luminous body (6) and which comprises lead-in wires, which connect the ends of the luminous body to sealing foils (2) which are inserted into the pinch or into the pinches, and which are incorporated into the pinch over a portion of their length,

characterized in that at least one of the lead-in wires is made of a section (19) of a single spiraling in which a recess in the form of a sheath is formed which does not comprise a

mandrel, and the portion of which is inserted into the pinched portion (5) is free of quartz glass and forms a purge channel which ensures safety.

2. Halogen incandescent lamp as defined in Claim 1, characterized in that the bulb is pinched on one side, with the luminous body being curved in the form of a U or in the form of a V, and the two lead-in wires are arranged approximately parallel in the form of single spiraled sections (19) and are incorporated by fusion into the pinch.

3. Halogen incandescent lamp as defined in Claim 1, characterized in that said bulb is pinched on both sides, with the luminous body being arranged axially and a lead-in wire being incorporated by fusion into a pinch in the form of a single spiraled section.

4. Halogen incandescent lamp as defined in Claim 1, characterized in that the bulb is pinched on one side, with the luminous body being arranged axially, and the lead-in wire leading to the input being arranged on the side of the pinch and incorporated by fusion into the pinch in the form of a single spiraled section.

5. Halogen incandescent lamp as defined in Claim 1, characterized in that the luminous body and the led-in wires are made of a single metal wire.

6. Halogen incandescent lamp as defined in the preceding claims, characterized in that the first spiraling of the luminous body and the single spiraling of the lead-in wires have the same pitch and the same inside diameter.

7. Halogen incandescent lamp as defined in Claims 1 to 5, characterized in that the diameter of the recess in the form of a sheath ranges from 50 to 200 μm.

8. Halogen incandescent lamp as defined in Claim 1 or 6, characterized in that the ratio of the ratio of diameter to pitch of the spiraled lead-in wires to the filament is less than 2.5

9. Halogen incandescent lamp as defined in Claim 1, characterized in that the section of single spiraled section is soldered directly to the sealing foil.

10. Halogen incandescent lamp as defined in Claim 9, characterized in that the single spiraled section of the sealing foil are coated with a platinum paste (22) in the soldering region.

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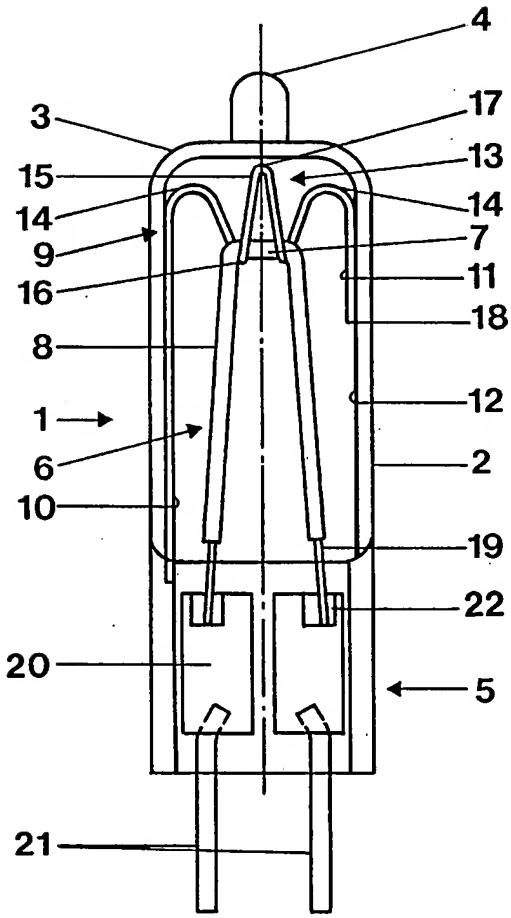

FIG. 1